

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets

(11)

EP 0 555 813 B1



(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention  
of the grant of the patent:  
24.09.1997 Bulletin 1997/39

(51) Int. Cl.<sup>6</sup>: B29D 30/08

(21) Application number: 93101998.8

(22) Date of filing: 09.02.1993

### (54) Plant for making tyre carcasses for vehicle wheels

Anlage zur Herstellung von Reifenkarkassen für Fahrzeugräder

Installation pour la fabrication de carcasses de pneumatiques pour roues de véhicules

(84) Designated Contracting States:  
DE ES FR GB

• Colombani, Bruno  
I-Milan (IT)

(30) Priority: 11.02.1992 IT MI920269

(74) Representative: Giannesi, Pier Giovanni et al  
Pirelli S.p.A.

(43) Date of publication of application:  
18.08.1993 Bulletin 1993/33

Direzione Proprietà Industriale  
Viale Sarca, 222  
20126 Milano (IT)

(73) Proprietor:

PIRELLI COORDINAMENTO PNEUMATICI S.p.A.  
20126 Milano (IT)

(56) References cited:

EP-A- 0 004 202	EP-A- 0 067 788
EP-A- 0 246 497	EP-A- 0 448 407
GB-A- 2 223 988	US-A- 3 318 745
US-A- 3 389 032	US-A- 4 053 342

(72) Inventors:

• Caretta, Renato  
I-Gallarate (VA) (IT)

EP 0 555 813 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

**Description**

The present invention relates to a plant for making tyre carcasses for vehicle wheels, comprising a plurality of assembling drums capable of being moved along a predetermined assembling path; a plurality of primary work stations disposed consecutively in side by side relation along said assembling path and each designed to apply, around each individual assembling drum, a main component common to a plurality of carcass types included in a given production range; at least one auxiliary work station disposed along said assembling path and designed to apply, around each individual assembling drum, at least a predetermined accessory component, intended for a specific one of said tyre carcass types.

It is known that in making vehicle tyres, for motor cars for example, the accomplishment of a so-called carcass is first provided, which carcass is achieved by successively assembling several different components.

In the connection it is noted that generally the use of a given number of main components is provided which are common to all carcass types falling within a given production range. There are then accessory components each relating to a specific carcass type included in said range.

In other words, the different carcass types included in a production range can be distinguished from one another depending on the presence thereon of the various accessory components and/or the typology of the accessory components themselves.

By way of example, when carcass for tubeless tyres are to be produced, that is tyres that in use do not require the presence of an inner tube, the main components can be considered to include a so-called "liner" that is a layer of elastomeric airproof material, a carcass ply, a pair of annular metal elements, commonly referred to as bead cores, around which the opposite ends of the carcass ply are folded, as well as a pair of side pieces made of elastomeric material, extending over the carcass ply at laterally opposite positions. The accessory components may in turn consist of one or more additional carcass plies, one or more reinforcing bands overlying the carcass ply or plies at the areas turned up around the bead cores, and others.

US-A- 4 985 100 discloses an apparatus for building tyres in which building drums are movable along a circular path between working stations which are all to be considered as primary stations in the meaning of the claimed invention since none of them is considered as optional in manufacturing the tyre. The stations disclosed in US-A- 4 985 100 are fixed and no provision is made for (additional) auxiliary stations that could be moved into a work position which was previously at least partially occupied by a primary station.

In modern production processes the assembling of the different components is carried out on automated plants including a plurality of assembling drums moved following a precise working sequence in accordance

with the manufacturing process to be executed. These plants consist of a plurality of work stations disposed consecutively in side by side relation, each of which lends itself to carry out the application of a predetermined component onto the assembling drums that in turn are brought in front of it.

In particular there are primary work stations intended for application of the main components, which are always active, irrespective of the carcass type being produced. Alternated with the various primary work stations there are one or more auxiliary work stations, intended for application of accessory components, if required. The activation or deactivation state of these auxiliary stations depends on the carcass type in progress of manufacture.

In accordance with the invention it has been found that in order to achieve a very versatile plant offering excellent features of flexibility in use, simple setting up and productivity, the auxiliary work stations should conveniently be quickly replaced by other stations more suitable for the type of process required at the moment, being at the same time adapted to be moved away from the path along which the assembling drums move, when they are to be kept inactive. Said primary work stations too should be movable along the assembling path so as to be moved apart from, and close to each other in order to enable one or more auxiliary stations to be inserted therebetween or removed therefrom. Thus a great simplification in the plant setting up and servicing operations is achieved, along with a reduction in the time required for carrying out the working cycle of the plant when the auxiliary stations are to be held at rest, as well as a great simplification in the operations necessary to adapt the plant to the manufacture of different carcass types.

The present invention in one main aspect relates to a plant for making tyre carcasses for vehicle wheels, comprising a plurality of assembling drums moved along an assembling path providing a number of stop positions, each intended for coinciding with a specific operating step of the carcass manufacturing process, characterized in that at least one auxiliary work station is movable between a rest position in which it is moved away from the assembling path, and a work position in which it is brought onto the assembling path and disposed in an operative condition at one of said stop positions, in order to carry out the application of one accessory component.

Preferably, the movement of the individual auxiliary work stations occurs following a trajectory perpendicular to said assembling path along which the auxiliary work stations operate preferably in alignment with the primary work stations, along a common work axis, advantageously the axis of rotation of the carcass being produced. The common work axis is preferably linear but may be curved or circular.

It is also provided that at least one of said primary stations may be alternately movable, parallelly to the assembling path, between one operating position, at

one of said drum stop positions, and a second position which is shifted in relation to said operating position by an amount not lower than the front bulkiness extension of at least an auxiliary work station in order to enable said auxiliary work station to occupy its work position at said drum stop position.

The present invention in a further aspect provides: one primary work station arranged to apply one main component, an elastomeric sealing layer for example, around the individual assembling drums; a second primary work station arranged to apply a second main component, one carcass ply for example, around said elastomeric sealing layer; one auxiliary work station arranged to optionally apply a semifinished additional piece, a second carcass ply for example, around the main carcass ply; a third primary work station arranged to apply a third main component, i.e. to associate a pair of bead cores for example with the opposite edges of the carcass ply or plies; a second auxiliary work station arranged to apply a further semifinished additional piece, a pair of reinforcing bands for example, at laterally opposite positions onto said carcass ply or plies; and a fourth primary work station arranged to add another main component, i.e. to apply a pair of side pieces of elastomeric material for example onto said carcass ply or plies, at laterally opposite positions.

Advantageously, each of said primary work stations is movable parallelly to the assembling path, between one operating position at one stop position of said drums and a second position in which it is moved away from the preceding position by substantially the same measure as the positioning pitch of said drum stop positions.

Further features and advantages will become more apparent from the detailed description of a preferred embodiment of a plant for making tyre carcasses for vehicle wheels in accordance with the invention, given hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

- Fig. 1 is a diagrammatic plan view of a plant for producing carcasses in accordance with the invention, also showing the working steps in succession carried out in the different work stations;
- Fig. 2 is a diagrammatic view of one of said assembled carcasses seen in section.

Referring particularly to Fig. 1, a plant for producing tyre carcasses for vehicle wheels in accordance with the present invention has been generally identified by reference numeral 1.

Plant 1 is intended for making a given range of carcass types, in particular carcasses for tyres of the type commonly referred to as tubeless, that is to be used without an inner tube. Said tyre production range is comprised of all tyres of different types and sizes that can be made on the same plant, keeping the corresponding equipments unchanged, such as for example the assembling drums, bead core supports, etc. One of

these carcasses is shown in Fig. 2 just as an indication, and denoted "C".

Plant 1 comprises a plurality of assembling drums 2 which are guided along a given assembling path providing different stop positions for the drums, at which positions each drum according to a specific operating step of the assembling process undergoes the application of a particular component intended for the achievement of carcass "C". In the particular embodiment shown, all stop positions are conveniently aligned along a common work axis coincident with the axis of the carcass being manufactured.

In known manner, between the different components that are used for the purpose of obtaining the assembled carcass "C", it is possible to identify main components that are common to all carcass types provided in the production range, and accessory components, each of which is specifically intended for a given type of carcass.

In the embodiment shown the main components comprise an airproof layer 4 of elastomeric sealing material commonly referred to as "liner", designed to internally cover or line the finished tyre, a main carcass ply 5 to be disposed over the elastomeric sealing layer 4, a pair of bead cores 6 provided with respective elastomeric fillers 6a to be engaged to the opposite ends of the carcass ply 5 and a pair of side pieces 7 of elastomeric material to be disposed over the carcass ply 5 at axially opposite positions.

The accessory components, in turn, may for example comprise an additional carcass ply 8 to be disposed over the main carcass ply 5 before the bead cores 6 are assembled and a pair of textile or metal reinforcing bands 9 to be disposed over the carcass ply or plies 5, 8 at laterally opposite positions, in the region of the folded portions of said plies, before the assembling of the side pieces 7.

The main components 4, 5, 6, 7 and accessories 8, 9 are sequentially engaged in known manner around the individual assembling drums 2 upon the action of respective primary work stations 10, 11, 12, 13 and auxiliary work stations 14, 15, operating at said drum stop positions.

In greater detail, at a first primary work station 10 the elastomeric airproof layer 4 is wrapped around the individual assembling drums 2.

Following the first primary station 10 there is a second primary work station 11 at which the main carcass ply 5 is wrapped around said drums, so as to overlie the airproof elastomeric layer 4.

Subsequently, the individual assembling drum 2 can be supplied from a first auxiliary assembling station 14, with the additional carcass ply 8 (see box "A" in dotted line in Fig. 1) designed to be disposed so as to overlie the main carcass ply. Then, each assembling drum 2 may be supplied from a third primary work station 12, with the bead cores 6 that are engaged to the carcass ply or plies 5, 8 by folding back the opposite ends of said plies around the bead cores. Afterwards (see box "B" in

dotted line in Fig. 1) the activation of the second auxiliary work station 15 may occur, this station being designed to apply the reinforcing bands 9, as well as of a fourth primary work station 13 on which the application of the side pieces 7 relies.

In an original manner, the auxiliary work stations 14, 15 are mounted on respective transverse slide guides 16, 17 and, upon command of actuators not shown as obtainable by any known manner, lend themselves to be individually displaced, preferably following a trajectory substantially perpendicular to the assembling path. The displacement of the individual auxiliary stations 14, 15 takes place between a rest position, in which said stations 14, 15 (as shown in Fig. 1) are moved away from the assembling path, in particular separated therefrom for possible interposition of primary stations 11, 12, and a work position in which they are located along the assembling path, being in alignment with the primary work stations 10, 11, 12, 13, and disposed operatively at one of said drum stop positions, in order to carry out the application of the corresponding accessory components 8, 9.

The possibility of moving the auxiliary work stations 14, 15 away from the assembling path, enabling them to be staggered relative to the primary work stations 10, 11, 12, 13, greatly facilitates the execution of all operations necessary for supplying said stations with the pieces of semifinished products to be assembled on the assembling drums 2, as well as the execution of possible servicing operations and operations tending to replace the supply turrets depending on the type of process to be carried out.

In addition, these supply, replacement and servicing operations are greatly facilitated as regards the primary work stations 10, 11, 12, 13 too, which are disposed adjacent the auxiliary stations 14, 15, by virtue of the free room created as a result of the auxiliary stations being moved to their rest position.

Preferably said auxiliary stations (14, 15) are located along the assembling path at the position made free by at least one of said primary work stations (11, 12), which is mounted in an original manner on respective longitudinal slide guides 18 extending parallelly to the assembling path and has been previously moved away from its work position, parallelly to the assembling path, by an amount not lower than the front bulkiness extension of the auxiliary work stations, in order to enable access of said stations to the respective work position, at the drum stop position.

According to a preferential aspect of the invention, each of the primary work stations 10, 11, 12, 13 is given this shifting possibility through said longitudinal slide guides 10: all stations can therefore be moved parallelly to the assembling path, between one operating position and a second position displaced sideways with respect to said first position. In addition and preferably the translation amount is substantially equal to the positioning pitch of the drum stop positions. It is therefore advantageously possible to move the primary work stations 10,

11, 12, 13 close to and away from each other.

In this way when the auxiliary stations must be brought from the rest position they occupy to the operating position, the primary work stations can be moved parallelly to the assembling path in order to enable access of the auxiliary stations to said path.

When for example, with reference to Fig. 1, the auxiliary station 14 need to be used for application of the additional component 8, the primary station 11 adjacent the auxiliary station 14 is moved sideways close to or away from the primary station 10 over a length at least equal to the front bulkiness extension of the auxiliary station 14 and preferably substantially corresponding to the positioning pitch of the drum stop positions, to enable the station 14 to gain access onto the assembling path.

Obviously the same as above also applies with reference to the primary work station 12 for the activation and deactivation of the second auxiliary work station 15.

It is of course possible, depending on the specific plant topography, to simultaneously move apart two adjacent primary stations in opposite directions in order to enable the auxiliary station lying behind to enter the area thus let free between said primary stations.

The mobility of the work stations parallelly to the assembling path also enables two different stations to work alternately at the same drum stop position.

As a result, the plant of the invention lends itself to be adapted in a very quick and easy manner to the specific assembling process suitable for the different carcass types.

It will be also recognized that the possibility of moving the individual primary work stations 10, 11, 12, 13 apart from each other offers the advantage of further facilitating the setting up and servicing operations to be carried out on said stations.

The assembled carcasses "C" in the manufacturing plant 1 must be then submitted at least to the application of a so-called "belt pack" and of a tread band before undergoing a vulcanization process for the purpose of obtaining a finished tyre.

This additional step is carried out in an usual manner following working processes and using plants commonly known to those skilled in the art.

In particular, these plants may be directly connected to the plant of the invention such as to accomplish an independent operating sequence producing tyres ready for vulcanization without solution of continuity from the semifinished product to the finished tyre.

Alternatively, carcasses produced on the plant of the invention can be sent to a store from which they will be subsequently withdrawn for supply to the separate plant carrying out the tyre completion through assembling of the belt pack 8 and tread band.

The tyre thus completed is ready for undergoing the final vulcanization step.

The invention attains important advantages.

From the above description it is in fact possible to assume that the possibility of moving the auxiliary work

stations away from the assembling path and moving the individual primary stations 10, 11, 12, 13 close to and away from each other makes the setting up and servicing of the manufacturing plant in question very easy, and above all offers an excellent flexibility of use of the same.

In fact the auxiliary stations 14, 15 can be replaced whenever necessary in order to meet any specific types of process and supplied with the respective appropriate accessory components (additional plies 5, reinforcing bands 9 or others) in a very easy manner and without requiring the plant operation to be stopped, as they can be set in operation on the assembling path at any desired moment.

Each auxiliary station 14, 15 may also be advantageously provided with an electrofluidic control and drive unit managing the operation thereof and adapted to be connected with the electronic unit managing the operation of the whole plant 1 merely through electric and fluidic connectors to be activated at the moment that the corresponding auxiliary station is brought to the operating condition.

Advantageously, the auxiliary work stations can be also utilized in place of one or more of the primary work stations, in order to avoid the operation of the plant being stopped during the setting and and/or servicing of the primary stations themselves.

The auxiliary work stations can in addition be conceived as removable and replaceable units in order to enable the setting up and/or servicing operations to be carried out at areas different from the ones where the plant is installed or for the purpose of serving a plurality of plants taking advantage of the different assembling processes simultaneously carried out on said plants.

Obviously many modifications and variations may be made to the invention as conceived without departing from the scope of the inventive idea characterizing it. For example also one or more of the primary stations may be conceived so as to be moved away from the assembling path, in the same manner as described with reference to the auxiliary stations.

### Claims

1. A plant for making tyre carcasses for vehicle wheels, comprising:

- a plurality of assembling drums (2) positioned for an advancing movement along an assembling path provided with a plurality of stop positions where at least a specific operating step of the manufacturing process of said carcasses is carried out;
- a plurality of primary work stations (10, 11, 12, 13) mounted on longitudinal guide means extending parallel to said assembling path, each station having means to apply, around each individual assembling drum (2), at said stop positions, a main tyre component (4, 5, 6,

7) which is common to a plurality of carcass (C) types included in a given production range, at least one of said primary work stations being movable along said guide means away from its stop position;

- at least one auxiliary work station (14, 15) having means to apply, around each individual assembling drum (2), one predetermined accessory tyre component (8, 9), intended for a specific one of said carcass (C) type included in said production range; characterized in that

said at least one auxiliary work station (14, 15) is mounted on guide means transverse to said longitudinal guide means for movement between a rest position in which it is away from the assembling path, and a work position in which it is brought onto the assembling path and disposed in an operative condition at one of said drum stop positions from which said at least one movable primary work station (10, 11, 12, 13) has been removed parallel to said assembling path, in order to carry out the application of said accessory component (8, 9).

2. A plant according to claim 1, characterized in that said at least one auxiliary work station (14, 15), when located in said work position along the assembling path, is in alignment with the primary work stations (10, 11, 12, 13), along a common work axis.

3. A plant according to claim 1, characterized in that at least one of said primary stations (10, 11, 12, 13) is movable parallelly to the assembling path, alternately between one operating position at one of said drum stop positions and a second position which is shifted in relation to said operating position by an amount not lower than the front bulkiness extension of at least one auxiliary work station in order to enable said auxiliary work station to occupy its work position at said drum stop position.

4. A plant according to claim 1, characterized in that it comprises:

- one primary work station (10) arranged to apply an elastomeric sealing layer (4) around the individual assembling drums (2);
- a second primary work station (11) arranged to apply one main carcass ply (5) around said elastomeric sealing layer (4);
- one auxiliary work station (14) arranged to optionally apply a semifinished additional piece (8) around the main carcass ply (5);
- a third primary work station (13) arranged to associate a pair of bead cores (6) with the

- opposite edges of the carcass ply (8);
- a second auxiliary work station (15) arranged to apply a further semifinished additional piece to said carcass ply (5); and
  - a fourth primary work station (13) arranged to apply a pair of side pieces of elastomeric material (7) to said carcass ply (5), at laterally opposite positions.
- 5
5. A plant according to claim 5, characterized in that each of said primary work stations (10, 11, 12, 13) is movable parallelly to the assembling path, between one operating position, at one stop position of said drums, and a second position in which it is moved away from the preceding position by substantially the same amount as the positioning pitch of said drum stop positions.
- 10
6. A plant according to anyone of the preceding claims, characterized in that said common work axis is the axis of rotation of said assembling drums.
- 20
7. A plant according to claim 1 characterized in that said assembling path is linear.
- 25
- dadurch gekennzeichnet,
- daß die wenigstens eine zusätzliche Arbeitsstation (14, 15) an Führungseinrichtungen quer zu den Längsführungseinrichtungen für eine Bewegung zwischen einer Ruhestellung, in der sie sich von der Montagestraße weg befindet, und einer Arbeitsstellung angeordnet ist, in der sie auf die Montagestraße gebracht und in einem Arbeitszustand an einer der Trommelhaltepositionen angeordnet ist, von denen die wenigstens eine bewegliche primäre Arbeitsstation (10,11,12,13) parallel zu der Arbeitsstraße entfernt worden ist, um das Aufbringen der Zubehörkomponente (8,9) auszuführen.
2. Anlage nach Anspruch 1, dadurch gekennzeichnet, daß die wenigstens eine zusätzliche Arbeitsstation (14,15), wenn sie längs der Montagestraße in der Arbeitsposition positioniert ist, fluchtend zu den primären Arbeitsstationen (10,11,12,13) längs einer gemeinsamen Arbeitsachse ausgerichtet ist.
3. Anlage nach Anspruch 1, dadurch gekennzeichnet, daß wenigstens eine der primären Stationen (10,11,12,13) parallel zu der Montagestraße abwechselnd zwischen einer Arbeitsposition an einer der Trommelhaltepositionen und einer zweiten Position bewegbar ist, die bezogen auf die Arbeitsposition um einen Betrag verschoben ist, der nicht kleiner als die vordere räumliche Erstreckung wenigsten einer zusätzlichen Arbeitsstation ist, um die zusätzliche Arbeitsstation in die Lage zu versetzen, ihre Arbeitsposition an der Trommelhalteposition zu besetzen.
4. Anlage nach Anspruch 1, dadurch gekennzeichnet, daß sie
- eine primäre Arbeitsstation (10), die für das Aufbringen einer elastomer Dichtungsschicht (4) um die einzelnen Montagetrommeln (2) herum angeordnet ist,
  - eine zweite primäre Arbeitsstation (11), die für das Aufbringen einer Hauptkarkassenlage (5) um die elastomere Dichtungsschicht (4) herum angeordnet ist,
  - eine zusätzliche Arbeitsstation (14), die für das fakultative Aufbringen eines halbfertigen zusätzlichen Teils (8) um die Hauptkarkassenlage (5) herum angeordnet ist,
  - eine dritte primäre Arbeitsstation (13), die für das Verbinden eines Paares von Wulstkernen (6) mit den gegenüberliegenden Rändern der Karkassenanlage (8) angeordnet ist,
  - eine zweite zusätzliche Arbeitsstation (15), die für das Anbringen eines weiteren halbfertigen
- 15
- 25
- 30
- 35
- 40
- 45
- 50
- 55

- zusätzlichen Teils an der Karkassenlage (5) angeordnet ist, und
- eine vierte primäre Arbeitsstation (13) aufweist, die für das Anbringen eines Paares von Seitenteilen eines elastomeren Materials (7) an der Karkassenlage (5) auf seitlich gegenüberliegenden Positionen angeordnet ist.
- 5
5. Anlage nach Anspruch 5, dadurch gekennzeichnet, daß jede der primären Arbeitsstationen (10,11,12,13) parallel zu der Arbeitsstraße zwischen einer Arbeitsstellung an einer Halteposition der Trommeln und einer zweiten Position bewegbar ist, in der sie von der vorhergehenden Position um im wesentlichen den gleichen Betrag wie die Positionierungsteilung der Trommelhaltepositionen weg bewegt ist. 10
- 15
6. Anlage nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die gemeinsame Arbeitsachse die Drehachse der Montagetrommeln ist. 20
- 25
7. Anlage nach Anspruch 1, dadurch gekennzeichnet, daß die Montagestraße linear ist.
- Revendications**
1. Installation pour fabriquer des carcasses de pneumatiques pour roues de véhicules, comprenant: 30
- une pluralité de tambours d'assemblage (2) positionnés en vue d'un mouvement d'avance le long d'un trajet d'assemblage présentant une pluralité de positions d'arrêt où au moins une étape opératoire spécifique du procédé de fabrication desdites carcasses est effectuée;
  - une pluralité de postes de travail principaux (10, 11, 12, 13) montés sur un moyen de guidage longitudinal s'étendant parallèlement au trajet d'assemblage, chaque poste comportant des moyens servant à appliquer, autour de chaque tambour d'assemblage individuel (2), auxdites positions d'arrêt, un composant de pneumatique principal (4, 5, 6, 7) qui est commun à une pluralité de types de carcasse (C) compris dans une gamme de fabrication donnée, au moins un desdits postes de travail principaux pouvant se déplacer le long dudit moyen de guidage en s'éloignant de sa position d'arrêt; 35
  - au moins un poste de travail auxiliaire (14, 15) comportant des moyens servant à appliquer, autour de chaque tambour d'assemblage individuel (2), un composant de pneumatique accessoire pré-déterminé (8, 9) destiné à un type spécifique de ladite carcasse (C) compris dans ladite gamme de fabrication; 40
  - caractérisée en ce que:
- 45
- 50
- 55
- ledit poste de travail auxiliaire (14, 15), en nombre d'au moins un, est monté sur un moyen de guidage transversal audit moyen de guidage longitudinal en vue d'un déplacement entre une position de repos, dans laquelle il est éloigné du trajet d'assemblage, et une position de travail, dans laquelle il est amené jusqu'sur le trajet d'assemblage et est disposé dans un état opérationnel à une desdites positions d'arrêt de tambour, d'où ledit poste de travail principal déplaçable (10, 11, 12, 13) a été évacué parallèlement audit trajet d'assemblage, afin que soit effectuée l'application dudit composant accessoire (8, 9).
2. Installation selon la revendication 1, caractérisée en ce qu'au moins un poste de travail auxiliaire (14, 15), quand il se trouve dans ladite position de travail le long du trajet d'assemblage, est aligné avec les postes de travail principaux (10, 11, 12, 13), le long d'un axe de travail commun.
- 25
3. Installation selon la revendication 1, caractérisée en ce qu'au moins un desdits postes principaux (10, 11, 12, 13) est déplaçable parallèlement au trajet d'assemblage, alternativement entre une position active à une desdites positions d'arrêt de tambour et une deuxième position qui est décalée par rapport à ladite position opérationnelle d'une distance qui n'est pas inférieure à la dimension d'encombrement avant d'au moins un poste de travail auxiliaire afin de permettre audit poste de travail auxiliaire d'occuper sa position de travail à ladite position d'arrêt de tambour.
- 40
4. Installation selon la revendication 1, caractérisée en ce qu'il comprend:
- un poste de travail principal (10) conçu pour appliquer une couche élastomère d'étanchéité (4) autour des tambours d'assemblage individuels (2);
  - un deuxième poste de travail principal (11) conçu pour appliquer une nappe principale (5) de carcasse autour de ladite couche élastomère d'étanchéité (4);
  - un poste de travail auxiliaire (14) conçu pour appliquer facultativement une pièce supplémentaire semi-finie (8) autour de la nappe principale (5) de carcasse;
  - un troisième poste de travail principal (13) conçu pour associer une paire de tringles (6) de talons aux bords opposés de la nappe (5) de carcasse;
- 45
- 50
- 55
- un deuxième poste de travail auxiliaire (11) conçu pour appliquer une autre pièce supplémentaire semi-finie à ladite nappe (5) de

carcasse; et

- un quatrième poste de travail principal (13) conçu pour appliquer une paire de pièces de matériau élastomère (7) à ladite nappe (5) de carcasse, à des positions latéralement opposées.

5

5. Installation selon la revendication 5, caractérisée en ce que chacun desdits postes de travail principaux (10, 11, 12, 13) est déplaçable parallèlement au trajet d'assemblage, entre une position active, à une position d'arrêt desdits tambours, et une deuxième position dans laquelle il est éloigné de la position précédente sensiblement de la même distance que le pas de positionnement desdites positions d'arrêt de tambour.
- 10
6. Installation selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit axe de travail commun est l'axe de rotation desdits tambours d'assemblage.
- 20
7. Installation selon la revendication 1, caractérisé en ce que ledit trajet d'assemblage est linéaire.

25

30

35

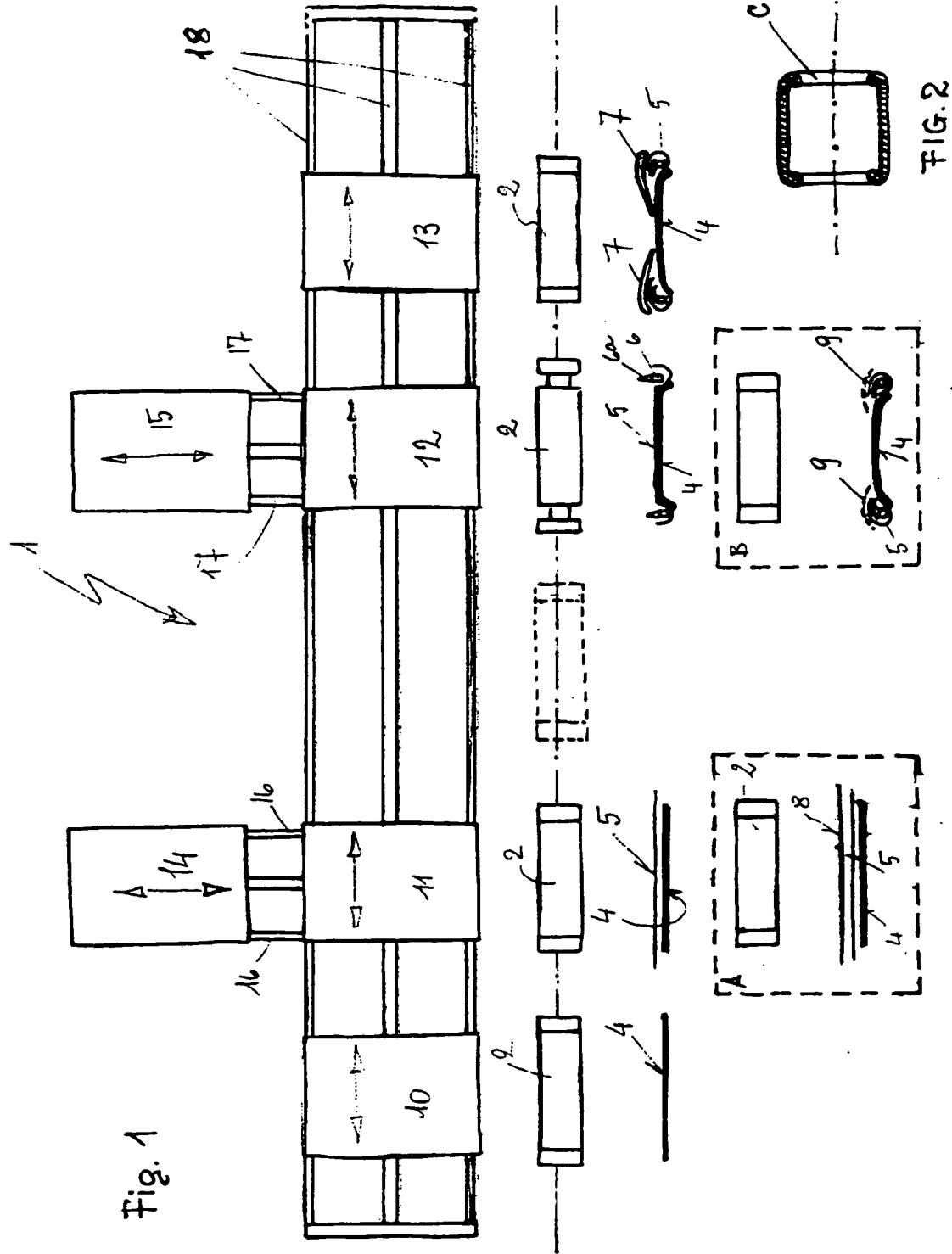
40

45

50

55

8

**FIG. 2**

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**